



MITAVITE®

LEADERS IN EQUINE NUTRITION

Feeding for Power & Protection

Avoiding fatigue is one of the fundamentals for performance. Feeding the correct nutrients to boost energy reserves and defense systems is essential to protect against fatigue. However, several nutritional problems start to appear at high levels of performance: the inability to take in enough calories without overloading the digestive system with simple sugars and starches; over-production of toxic oxygen by-products, and a buildup of heat in the tissues. Fortunately, recent advances in nutrition science have created feeding options to counter many of these performance-limiting consequences of exercise.

Increased oxygen consumption during exercise provides a metabolic advantage for energy production - paradoxically it also causes injury to muscle cells. A 30-fold increase in oxygen consumption and a 100-fold increase in the amount of oxygen delivered to the working muscles accompanies strenuous exercise - and, like all metabolic processes, oxygen utilization generates a waste product - the free radical (also known as a 'reactive oxygen species' - ROS). Prolonged strenuous exercise increases the production of free radicals - which can rapidly overwhelm the antioxidant defense system.

Muscle cell leakage and antioxidant status are linked - increasing distance and/or speed is correlated with depletion of blood antioxidant levels and increased muscle enzyme levels in blood. If antioxidant systems become depleted during exercise, the susceptibility of injury to tissues is enhanced, resulting in oxidative stress and a chain reaction of damage to cell enzymes and membranes. This damage contributes to muscle soreness, fatigue and several pathological conditions.

To protect against oxidative damage, the horse has defense systems that scavenge free radicals. Positioned at specific locations on cell membranes and inside cells, are antioxidants. Vitamin E is a fat-soluble, chain-breaking, free radical scavenger located in cell membranes. Horses receiving additional vitamin E and selenium have increased antioxidant defenses, demonstrated by, amongst other things, increased stability of red cell membranes. The rationale for using a combination of antioxidants is synergy - the combination of vitamin E and selenium produces increased blood levels of antioxidants before, during and after exercise, and a reduction in blood markers for pulmonary and systemic oxidative stress.

The National Research Council (NRC) recommends a dietary vitamin E concentration of 80 iu/kg of feed - not enough to maintain blood levels in horses in regular work, where up to 300iu vitamin E/kg feed is required to maintain blood and skeletal muscle concentrations. Supplementary vitamin E and Selenium is beneficial for all horses experiencing oxidative stress, such as during parturition, transport, endurance or racing. In addition, vitamin E supplementation has been shown to reduce the incidence of illness (fever, respiratory symptoms) following prolonged transportation of weanlings and yearlings.

Rice bran is one of the best natural sources of the powerful, trace-mineral, anti-oxidant selenium - which is also essential for thyroid function. Benefits of selenium supplementation include fewer infections, improved wound healing, better stress tolerance and a reduction in exercise-associated muscle problems. Ferulic acid, a phytochemical naturally-occurring in rice bran, exhibits a wide range of beneficial activity, due in part to its strong anti-oxidant properties.

The effectiveness of dietary nutrient composition is also measured in terms of metabolic efficiency - that is, maximum power output with minimum production of undesirable products, such as heat and acid. To supply energy for performance, the extraordinarily high energy content of dietary fats is not even approximately achieved with other feedstuffs. In all disciplines, including racing, dressage and pleasure, the reduction in feed intake required to maintain body weight is remarkably high with oil-rich feeds. A relevant explanation for this reduced intake is the especially high yield of net energy from oil-rich feeds.

The benefit for performance of the high net energy may however be eclipsed by the low glycaemic index of high oil feeds. The glycaemic index (or glycaemic response) measures the effect the feed has on blood glucose and insulin - a high glycaemic index means the feed produces a rapid rise in glucose and insulin, followed by a rapid fall in blood glucose. The reason this is important, is because a drop in blood glucose indicates a lack of glucose availability for the muscle and brain - and this has a deleterious effect on performance.

The concentrations of glucose in the blood plasma of horses on oil-enriched diets are

higher compared to horses fed high-starch Diets. This effect on the glucose concentration, also known as a 'glucose sparing effect', has been described repeatedly in horses on oil-rich feeds, both during and after exercise. Raw grain causes a large increase in blood glucose and insulin. This predisposes the horse to early fatigue as blood glucose and carbohydrate stores in muscle are rapidly used up and fat utilization is inhibited. Increased insulin also increases muscle permeability, which in turn is detected by increased plasma muscle enzyme levels (blood CK).

The highest glycaemic response occurs with sweet feed, followed by oats and corn, however, supplementing high starch diets with an oil-rich concentrate decreases the all-important, glycaemic response. A low glycaemic index means the feed causes a slow and sustained rise in blood glucose. Oils have a low GI, meaning the rise in blood glucose is long and sustained. Rice bran is also low GI and this, combined with its high oil content; make it the ideal feeding supplement for maintaining blood glucose in performance horses. Rice bran supplemented horses also show lower lactate levels and lower heart rates during exercise, giving an added edge. Lactic acid accumulation after exercise can limit performance, and any factor that can lower lactate production can enhance performance. In the life sciences, the evaluation of oxidative stress contributes more and more to the knowledge of fundamental mechanisms involved in aging, tumor development, and metabolic disorders, such as diabetes and Alzheimer. Whenever equilibrium is broken, a progressive oxidation of other biological substrates occurs. This cascade mechanism progressively increases the biological damage.

To achieve the nutritional goals of increased energy, reduced gut ballast, improved power-to-weight ratio, decreased heat and acid production, and to strengthen the anti-oxidant defense system, Vitavite has released POWER-ON. An oil-enriched, performance supplement, contributing therapeutic levels of vitamin E and selenium, in a palatable extruded rice bran - providing power and protection to performance horses and those with increased demands secondary to travelling, breeding or stress. Vitavite POWER-ON - a simple solution to a complex problem.

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